



November 14, 2007

Ms. Nicole LaFranchise  
Port of Portland  
121 NW Everett Street  
Portland, OR 97208

Re: Former Substation and Berth 305 Sampling Results Addendum  
Swan Island Upland Facility  
Portland, Oregon  
ECSI No. 271  
1115

Dear Ms. LaFranchise:

This letter describes the additional sampling activities completed at the former Kaiser-era substations and Berth 305 area located at the Swan Island Upland Facility (SIUF; the Facility) in Portland, Oregon (Figure 1). The Port of Portland (Port) is conducting this work pursuant to a Voluntary Cleanup Program (VCP) Agreement with the Oregon Department of Environmental Quality (DEQ) for Remedial Investigation (RI), Source Control Measures (SCMs), and Feasibility Study (FS) at the Facility (dated July 24, 2006). The activities presented in this letter were completed in support of the RI for the Facility and included direct-push explorations completed to collect soil samples for chemical analysis.

## **Background**

The Port is conducting an RI/FS for the Facility. The SIUF, previously known as the Portland Shipyard (PSY), is identified by the DEQ as Environmental Cleanup Site Information (ECSI) Site No. 271. The RI is being performed in accordance with the November 2, 2000 RI/FS Work Plan for the PSY (Bridgewater, 2000). For purposes of the RI, the SIUF has been divided into three operable units (OUs; as shown on Figure 2):

- OU1 – Upland property owned by Cascade General, referred to as the Cascade General Ship Repair Yard (CGSRY) and formerly known as the PSY.
- OU2 – Upland property owned by the Port south of N. Channel Avenue, which includes a paved parking lot that was previously part of the PSY and an undeveloped property formerly referred to as the N. Channel Avenue Fabrication Site.
- OU3 – Upland property owned by the Port on N. Lagoon Avenue, which includes the property at 5420 N. Lagoon Avenue and the adjacent property to the north that provides access to Berths 308 and 309.

## Former Substations

Research conducted during the preparation of the DRAFT Supplemental Preliminary Assessment (PA; Ash Creek Associates [ACA], 2006) identified seven Kaiser-era substations (B, D, E, F, J, K, and L) located on OU1, four Kaiser-era substations (A, P, Q, and R) located on OU2, and one Kaiser-era substation (M) located on OU3 (see Figure 2). Other than Substation J, which is in the same location as current Substation 4, none of these substations are currently present.

An initial evaluation of available information for these substations concluded that electrical equipment suspected to contain polychlorinated biphenyls (PCBs) was present in four of the seven OU1 substations (B, J, K, and L), all four of the OU2 substations, and in the substation at OU3. Of the three remaining substations (D, E, and F), there was no information on the equipment at Substation D, and Substations E and F were thought to utilize only insulators, switches, and wire. Accordingly, a determination for sampling the former substations was made based on the following:

- OU1 – Substation J was in the same location as the existing Substation 4, where soil samples were collected during Phase I of the RI. Thus, no further investigation of Substation J was proposed. No soil samples had been collected at the locations of the other six substations. No sampling was recommended at Substations E and F based on the type of equipment they contained. The remaining four substations (B, D, L, and K) contained either unknown equipment or equipment suspected to contain PCBs. In order to assess this data gap, the DEQ requested sampling of these four former substation locations in an e-mail to the Port dated October 19, 2006. The Port presented a sampling approach in the Phase II RI Work Plan Addendum (Bridgewater, 2006).
- OU2 – No soil samples had been collected at the OU2 substation locations. Soil sampling at all four substations was requested by DEQ in a meeting attended by Stu Brown (Bridgewater) on behalf of the Port on April 24, 2007.
- OU3 – The DEQ recommended soil sampling at Substation M in a letter dated January 25, 2007. The Port presented a proposed sampling approach in a letter to the DEQ dated March 20, 2007, which the DEQ approved (in a letter dated April 6, 2007).

Following preparation of the Supplemental PA (ACA, 2006) and the Phase II RI Work Plan Addendum (Bridgewater, 2006), the Port discovered additional information that revealed Substations E and F contained electrical equipment suspected to contain PCBs. The Port notified the DEQ of these additional substations in the Former Substation Sampling Results letter (dated July 24, 2007) as well as in personal communication between ACA and the DEQ. The DEQ agreed that these additional substations should be sampled and approved the schedule.

## Berth 305 Area

In a November 20, 2006 letter responding to the submittal of the Phase II RI Work Plan Addendum (Bridgewater, 2006), the DEQ requested the Port conduct supplemental sampling activities in the vicinity of Berth 305. The DEQ requested laboratory analysis of three surface samples to support the conclusion that there are not upland sources of zinc and polynuclear aromatic hydrocarbons (PAHs) in this area. In addition, the DEQ requested a figure showing the location of the storm water conveyance system at and near Berth 305.

The results of sampling activities completed for Substations A, B, D, K, L, M, P, Q, and R were reported in a letter prepared by ACA on behalf of the Port (ACA, 2007). This addendum presents the results for Substations E and F and Berth 305 supplemental sampling activities requested by the DEQ.

# **Site Investigation Activities**

## **Preparatory Activities**

The following activities and schedule coordination were completed in preparation for the field work.

- **Health and Safety Plan (HASP).** ACA prepared a HASP for its personnel involved with the project. The HASP was available to the subcontractors who supported the field activities.
- **Underground Utility Location.** An underground utility locate was conducted by submitting a request to the Oregon One-Call Utility Notification system and completing a private utility locate prior to performing the subsurface work.
- **Work Coordination.** The work activities were conducted in coordination with Cascade General (Vigor) schedules.

## **Direct-Push Explorations**

Soil samples were collected through direct-push explorations (completed by Cascade Drilling, under subcontract to ACA) on August 2, 2007. The direct-push explorations were completed to a depth of 2 to 5 feet below the ground surface (bgs). Soil cores were obtained continuously from near the ground surface to the total depth of each exploration. Field exploration logs are included in Attachment A. Each soil sample was field-screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and for the presence of petroleum hydrocarbons using a sheen test. No field indications of contamination were observed.

After sampling activities were completed, each exploration was abandoned in accordance with Oregon Water Resources Department (OWRD) regulations and procedures. The abandonment procedure consisted of filling the exploration with granular bentonite and hydrating the bentonite with water. Asphalt-concrete or gravel was placed at the surface to match the surrounding materials.

Soil was placed in a drum approved by the Oregon Department of Transportation (ODOT) for transporting hazardous waste. Decontamination water was placed in the poly tank located on the Facility. The drummed soil and water were stored at the Facility in preparation for disposal or treatment at an off-site location.

All drums were labeled with the site name, generated contents, and date. Disposable items such as gloves, pump tubing, paper towels, etc., were placed in plastic bags after use and deposited in trash receptacles for disposal.

**Former Substations.** Surface soil samples were collected at former Substations E and F. The sample locations are shown on Figure 2. The exact size of each former substation is unknown; however, based on information reviewed by the Port during preparation of the DRAFT Supplemental PA (ACA, 2006), the substations were likely similar in size to Substation 4. Using the sample spacing for Substation 4 as a guide, soil samples were collected at the four corners of an approximately 30- by 30-foot square centered on the estimated location of each former substation (consistent with the sampling approach described in the RI/FS Work Plan for the existing substations). The samples were collected just below any asphalt-concrete/sub-base or gravel fill.

**Berth 305 Area.** Surface soil samples were collected at three locations (adjacent to Berth 305 and at former Substations K and L; Figure 2). The samples were collected just below any asphalt-concrete/sub-base or gravel fill in the center of the substation sampling grid (for locations K and L).

## **Analytical Results**

Soil samples collected from the above activities were submitted to Columbia Analytical Services, Inc. in Kelso, Washington, for chemical analysis. Copies of the laboratory reports are included in Attachment B (in CD-ROM format due to the length of the Level III deliverable report). The samples were analyzed on a standard turnaround time (up to 10 business days). A quality assurance review of the data was completed. No qualifiers were attached to the data as a result of our review. The laboratory analytical results are summarized in Tables 1 through 4.

The detected concentrations were compared to the following screening levels:

### **Human Health**

- DEQ Risk-Based Concentrations (RBCs) from the Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites guidance (September 22, 2003; RBC Table Revised July 4, 2007).
- EPA Region 6 Human Health Medium-Specific Screening Levels (SSLs; EPA, 2006).

### **Ecological Receptors**

- DEQ screening level values (SLVs) for terrestrial receptors (DEQ, 2001).

## **Former Substations**

**Total Petroleum Hydrocarbons (TPH).** The soil samples were analyzed for TPH hydrocarbon identification by Northwest Method NWTPH-HCID. TPH was not detected in the samples above the method reporting limit (MRL; Table 1).

**PCBs.** The soil samples were analyzed for PCBs by EPA Method 8082. Aroclor 1260 was detected in one sample from Substation E and one sample from Substation F (Table 2). None of the detected concentrations exceeded the screening levels.

## **Berth 305 Area**

**PAHs.** The soil samples were analyzed for PAHs by EPA Method 8270C-SIM. None of the detected analytes exceeded the screening levels (Table 3).

**Metals.** The soil samples were analyzed for metals by EPA 6000/7000 Series Methods and the results are summarized in Table 4. Metals occur naturally in soil. Therefore, to assist in evaluating the analytical data, background concentrations of metals are also provided in Table 4 for comparison. The background levels are from the Washington Department of Ecology's publication Natural Background Soil Metals Concentration in Washington State, dated October 1994. One metal (zinc) in one sample (Sub K-C-1) exceeded the background concentration. The zinc concentration also exceeded the terrestrial SLV but was below an asphalt-concrete surface.

## **Summary and Conclusions**

**Former Substations.** Sampling activities were completed at the locations of two former Kaiser-era substations that may have utilized electrical equipment containing PCBs. These activities were completed in support of the RI for the Facility. Soil samples were analyzed for petroleum hydrocarbon identification by Northwest Method NWTPH-HCID and for PCBs. TPH was not detected in any of the samples. Aroclor 1260 was detected in one sample from

Substation E and one sample from Substation F; however, both detections were below screening levels. Furthermore, an asphalt/concrete surface was present at the locations where PCBs were detected.

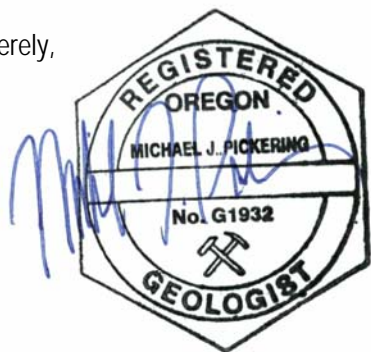
Based on the results presented in this addendum and the July 2007 letter (ACA, 2007), the investigation of the former Kaiser-era substations sampled is complete and no further activities are recommended in those areas.

**Berth 305 Area.** Three surface soil samples were collected and analyzed for PAHs and metals. None of the detected PAHs exceeded the screening levels. Zinc was detected above the background concentration in one sample (Sub K-C-1). The zinc concentration was below the human health risk-screening criteria but above the terrestrial SLV. However, this area is covered by with asphalt-concrete. None of the other detected metals concentrations exceeded the background values.

Integral Consulting, Inc. is assisting the City of Portland in updating their GIS outfall layer by conducting field-verification activities. Integral is working with Cascade General to complete the updates for OU1. Since the Port no longer owns OU1, the timeline for completion of these activities will be determined by Integral/Cascade General. Once the GIS updates are complete, the Port will submit a figure to the DEQ showing the storm water conveyance system at and near Berth 305.

If you have any questions regarding these activities, please contact the undersigned at (503) 924-4704.

Sincerely,



Michael J. Pickering, R.G.  
Senior Project Hydrogeologist

Amanda L. Spencer, R.G.  
Principal

**Attachments:**

Table 1 – Soil Analytical Results: TPH  
Table 2 – Soil Analytical Results: PCBs  
Table 3 – Soil Analytical Results: PAHs  
Table 4 – Soil Analytical Results: Metals

Figure 1 – Site Location Map  
Figure 2 – Site Exploration Plan

Attachment A – Field Exploration Logs  
Attachment B – Analytical Laboratory Reports (CD-ROM)

## **References**

ACA, 2006. DRAFT Supplemental Preliminary Assessment, Swan Island Upland Facility, Portland, Oregon. December 2006.

ACA, 2007. Former Substation Sampling Results, Swan Island Upland Facility, Portland, Oregon. July 24, 2007.

Bridgewater, 2000. Remedial Investigation/Feasibility Study Work Plan for the Portland Shipyard, Portland, Oregon. November 2000.

Bridgewater, 2006. Phase II Remedial Investigation Work Plan Addendum, Operable Unit I, Swan Island Upland Facility, Portland, Oregon. October 2006.

DEQ, 2001. Level II screening level values. Oregon Department of Environmental Quality. Supplement to DEQ guidance for ecological risk assessment. December 2001.

DEQ, 2003. Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites. September 22, 2003 (RBC Table Revised July 4, 2007).

DEQ, 2006. OU1 RI WP Addendum – Swan Island Upland Facility, ECSI No. 71. Oregon Department of Environmental Quality. November 20, 2006.

EPA, 2006. EPA Region 6 Human Health Medium-Specific Screening Levels, United States Environmental Protection Agency Region 6, Dallas, Texas. December 2006.

Washington Department of Ecology's publication Natural Background Soil Metals Concentration in Washington State. October 1994.



Table 1  
Soil Analytical Results: TPH  
Swan Island Upland Facility  
Portland, Oregon

Operable Unit 1 - August 2007 Addendum								
Sample Number	Sub E-N-1	Sub E-E-1	Sub E-S-1	Sub E-W-1	Sub F-N-1	Sub F-E-1	Sub F-S-1	Sub F-W-1
Sampling Interval (inches)	7 - 23	7 - 19	8 - 23	9 - 21	4 - 21	13 - 28	8 - 22	4 - 19
Sample Date	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007
TPH-HCID	Concentrations in mg/kg (ppm)							
Gasoline-Range	<27	<27	<24	<26	<23	<24	<24	<26
Diesel-Range	<67	<67	<60	<64	<58	<58	<58	<63
Residual-Range	<140	<140	<120	<130	<120	<120	<120	<130

Operable Unit 1																
Sample Number	Sub B-N-1	Sub B-E-1	Sub B-S-1	Sub B-W-1	Sub D-N-1	Sub D-E-1	Sub D-S-1	Sub D-W-1	Sub K-N-1	Sub K-E-1	Sub K-S-1	Sub K-W-1	Sub L-N-1	Sub L-E-1	Sub L-S-1	Sub L-W-1
Sampling Interval (inches)	20 - 34	20 - 34	14 - 26	9 - 22	12 - 24	10 - 22	12 - 24	11 - 24	9 - 22	12 - 25	15 - 25	9 - 21	17 - 29	20 - 32	13 - 25	12 - 26
Sample Date	5/31/2007	39,233	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
TPH-HCID	Concentrations in mg/kg (ppm)															
Gasoline-Range	<27	<25	<22	<22	<23	<22	<23	<23	<22	<23	<22	<22	<22	<26	<23	<23
Diesel-Range	<67	<62	<54	<55	<58	<54	<58	<57	<55	<56	<55	<54	<55	<65	<57	<57
Residual-Range	<140	<130	<110	<110	<120	<110	<120	<120	<110	<120	<110	<110	<110	<130	<120	<120

Operable Unit 2																
Sample Number	Sub A-N-1	Sub A-E-1	Sub A-S-1	Sub A-W-1	Sub P-N-1	Sub P-E-1	Sub P-S-1	Sub P-W-1	Sub Q-N-1	Sub Q-E-1	Sub Q-S-1	Sub Q-W-1	Sub R-N-1	Sub R-E-1	Sub R-S-1	Sub R-W-1
Sampling Interval (inches)	30 - 40	34 - 46	28 - 40	22 - 34	4 - 14	4 - 18	19 - 30	5 - 17	7 - 12	10 - 15	12 - 18	14 - 20	13 - 23	14 - 28	10 - 24	14 - 25
Sample Date	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/3/2007	5/3/2007	5/3/2007	5/3/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
TPH-HCID	Concentrations in mg/kg (ppm)															
Gasoline-Range	<22	<22	<22	<24	<26	<22	<29	<25	<20	<20	<20	<20	<27	<24	<24	<27
Diesel-Range	<54	<54	<55	<59	<63	<55	<71	<62	<50	<50	<50	<50	<68	<59	<60	<66
Residual-Range	<110	<110	<110	<120	<130	<110	<150	<130	<100	<100	<100	<100	<120 *	<140	<120	<140

Operable Unit 3				
Sample Number	Sub M-N-1	Sub M-E-1	Sub M-S-1	Sub M-W-1
Sampling Interval (inches)	13 - 25	16 - 28	5 - 15	15 - 26
Sample Date	5/31/2007	5/31/2007	5/31/2007	5/31/2007
TPH-HCID	Concentrations in mg/kg (ppm)			
Gasoline-Range	<22	<22	<22	<22
Diesel-Range	<54	<54	<55	<55
Residual-Range	<110	<110	<110	<110

- Notes:**
1. TPH-HCID = Hydrocarbons identification by Northwest Method NWTPH-HCID.
  2. mg/kg = milligram per kilogram (parts per million [ppm]).
  3. < = Not detected above the method reporting limit.
  4. \* = Chemical results from diesel and residual-range petroleum hydrocarbons follow-up analysis by Northwest Method NWTPH-Dx (with silica gel cleanup).
  5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.  
- For example, Sub M-N-1 = Substation M, North corner, sample 1.

Table 2  
Soil Analytical Results: PCBs  
Swan Island Upland Facility  
Portland, Oregon

Operable Unit 1 - August 2007 Addendum											
Sample ID: Sampling Interval (inches) Sample Date:	Screening Levels			Sub E-N-1	Sub E-E-1	Sub E-S-1	Sub E-W-1	Sub F-N-1	Sub F-E-1	Sub F-S-1	Sub F-W-1
	RBC	SSL	SLV	7 - 23	7 - 19	8 - 23	9 - 21	4 - 21	13 - 28	8 - 22	4 - 19
				8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007	8/2/2007
PCBs											
				Concentrations in µg/kg (ppb)							
Aroclor 1016	980	24,000	100,000	<10	<10	<10	<10	<10	<10	<10	<9.9
Aroclor 1221	980	830	--	<20	<20	<20	<20	<20	<20	<20	<20
Aroclor 1232	980	830	--	<10	<10	<10	<10	<10	<10	<10	<9.9
Aroclor 1242	980	830	1,500	<10	<10	<10	<10	<10	<10	<10	<9.9
Aroclor 1248	980	830	--	<10	<10	<10	<10	<10	<10	<10	<9.9
Aroclor 1254	980	830	700	<10	<10	<10	<10	<27 i	<10	<10	<9.9
Aroclor 1260	980	830	--	<10	15	<10	<10	<41 i	<10	<10	110

Operable Unit 1																			
Sample ID: Sampling Interval (inches) Sample Date:	Screening Levels			Sub B-N-1	Sub B-E-1	Sub B-S-1	Sub B-W-1	Sub D-N-1	Sub D-E-1	Sub D-S-1	Sub D-W-1	Sub K-N-1	Sub K-E-1	Sub K-S-1	Sub K-W-1	Sub L-N-1	Sub L-E-1	Sub L-S-1	Sub L-W-1
	RBC	SSL	SLV	20 - 34	20 - 34	14 - 26	9 - 22	12 - 24	10 - 22	12 - 24	11 - 24	9 - 22	12 - 25	15 - 25	9 - 21	17 - 29	20 - 32	13 - 25	12 - 26
				5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/3/2007	5/3/2007	5/3/2007	5/3/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
PCBs																			
				Concentrations in µg/kg (ppb)															
Aroclor 1016	980	24,000	100,000	<9.9	<10	<9.9	<9.9	<10	<10	<10	<10	<10	<9.9	<10	<9.9	<10	<10	<10	<9.9
Aroclor 1221	980	830	--	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Aroclor 1232	980	830	--	<9.9	<10	<9.9	<9.9	<10	<10	<10	<10	<10	<9.9	<10	<9.9	<10	<10	<10	<9.9
Aroclor 1242	980	830	1,500	<9.9	<10	<9.9	<9.9	<10	<10	<10	<10	<10	<9.9	<10	<9.9	<10	<10	<10	<9.9
Aroclor 1248	980	830	--	<9.9	<10	<9.9	<9.9	<10	<10	<10	<10	<10	<9.9	<10	<9.9	<10	<10	<10	<9.9
Aroclor 1254	980	830	700	<9.9	<10	<9.9	<9.9	<10	<10	<10	<10	<10	<9.9	<10	<9.9	<10	<10	<10	<9.9
Aroclor 1260	980	830	--	<9.9	<10	<9.9	77	<10	<10	<10	<10	19	97	48	<9.9	<10	<10	<10	<9.9

Operable Unit 2																			
Sample ID: Sampling Interval (inches) Sample Date:	Screening Levels			Sub A-N-1	Sub A-E-1	Sub A-S-1	Sub A-W-1	Sub P-N-1	Sub P-E-1	Sub P-S-1	Sub P-W-1	Sub Q-N-1	Sub Q-E-1	Sub Q-S-1	Sub Q-W-1	Sub R-N-1	Sub R-E-1	Sub R-S-1	Sub R-W-1
	RBC	SSL	SLV	30 - 40	34 - 46	28 - 40	22 - 34	4 - 14	4 - 18	19 - 30	5 - 17	7 - 12	10 - 15	12 - 18	14 - 20	13 - 23	14 - 28	10 - 24	14 - 25
				5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/3/2007	5/3/2007	5/3/2007	5/3/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
PCBs																			
				Concentrations in µg/kg (ppb)															
Aroclor 1016	980	24,000	100,000	<9.6	<9.6	<9.9	<10	<9.9	<9.8	<10	<9.9	<9.9	<10	<10	<9.9	<9.7	<9.8	<9.8	<9.9
Aroclor 1221	980	830	--	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Aroclor 1232	980	830	--	<9.6	<9.6	<9.9	<10	<9.9	<9.8	<10	<9.9	<9.9	<10	<10	<9.9	<9.7	<9.8	<9.8	<9.9
Aroclor 1242	980	830	1,500	<9.6	<9.6	<9.9	<10	<9.9	<9.8	<10	<9.9	<9.9	<10	<10	<9.9	<9.7	<9.8	<9.8	<9.9
Aroclor 1248	980	830	--	<9.6	<9.6	<9.9	<10	<9.9	<9.8	<10	<9.9	<9.9	<10	<10	<9.9	<9.7	<9.8	<9.8	<9.9
Aroclor 1254	980	830	700	<9.6	<9.6	<9.9	<10	<9.9	<9.8	<10	<9.9	<9.9	<10	<10	<9.9	<9.7	<9.8	<9.8	<9.9
Aroclor 1260	980	830	--	<9.6	<9.6	<9.9	<10	<9.9	<9.8	<10	<9.9	44	47	<10	48	<9.7	<9.8	<9.8	<9.9

Operable Unit 3							
Sample ID: Sampling Interval (inches) Sample Date:	Screening Levels			Sub M-N-1	Sub M-E-1	Sub M-S-1	Sub M-W-1
	RBC	SSL	SLV	13 - 25	16 - 28	5 - 15	15 - 26
				5/31/2007	5/31/2007	5/31/2007	5/31/2007
PCBs							
				Concentrations in µg/kg (ppb)			
Aroclor 1016	980	24,000	100,000	<9.9	<9.9	<9.9	<10
Aroclor 1221	980	830	--	<20	<20	<20	<20
Aroclor 1232	980	830	--	<9.9	<9.9	<9.9	<10
Aroclor 1242	980	830	1,500	<9.9	<9.9	<9.9	<10
Aroclor 1248	980	830	--	<9.9	<9.9	<9.9	<10
Aroclor 1254	980	830	700	<9.9	<9.9	<9.9	<10
Aroclor 1260	980	830	--	<9.9	<9.9	<9.9	<10

- Notes:
- PCBs = Polychlorinated Biphenyls by EPA Method 8082.
  - µg/kg = micrograms per kilogram (parts per billion [ppb]).
  - < = Not detected above the method reporting limit.
  - Shading = Detected concentration.
  - Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.  
- For example, Sub M-N-1 = Substation M, North corner, sample 1.
  - RBC = Oregon Department of Environmental Quality Risk-Based Concentrations (RBC Table Revised July 4, 2007) for the direct contact exposure scenario (occupational receptors).  
Screening values for individual aroclors unavailable. RBC for total PCBs presented.
  - SSL = EPA Region 6 Human Health Medium-Specific Screening Levels (December 2006) for soil (industrial outdoor worker).
  - SLV = Oregon Department of Environmental Quality Level II Screening Level Values (SLVs) for Terrestrial Receptors (lowest available value).



Table 3  
Soil Analytical Results: PAHs  
Swan Island Upland Facility  
Portland, Oregon

Operable Unit 1 - August 2007 Addendum						
Sample ID:	Screening Levels			Sub K-C-1	Sub L-C-1	Berth 305-1
Sampling Interval (inches)	RBC	SSL	SLV	7 - 19	12 - 27	11 - 21
Sample Date:				8/2/2007	8/2/2007	8/2/2007
<b>PAHs</b>	Concentrations in µg/kg (ppb)					
Naphthalene	770,000	210,000	10,000	1.2 J	4.6 J	13
2-Methylnaphthalene	--	--	--	0.96 J	2.8 J	2.9 J
Acenaphthene	41,000,000	33,000,000	20,000	<5	0.85 J	0.60 J
Acenaphthylene	--	--	--	<5	6.0	2.1 J
Anthracene	--	100,000,000	--	0.73 J	11	2.0 J
Benz(a)anthracene	2,700	2,300	--	6.4	98	5.0
Benzo(a)pyrene	270	230	125,000	5.9	76	5.2
Benzo(b)fluoranthene	2,700	2,300	--	11	64	7.7
Benzo(g,h,i)perylene	--	--	--	10	38	12
Benzo(k)fluoranthene	27,000	23,000	--	2.9 J	26	2.5 J
Chrysene	270,000	234,000	--	9.3	100	8.5
Dibenz(a,h)anthracene	270	230	--	2.4 J	11	2.9 J
Dibenzofuran	--	--	2	<5	1.0 J	1.2 J
Fluoranthene	29,000,000	24,000,000	--	8.9	120	21
Fluorene	35,000,000	26,000,000	30,000	<5	2.4 J	1.0 J
Indeno(1,2,3-cd)pyrene	2,700	2,300	--	8.9	42	8.5
Phenanthrene	--	--	--	2.8 J	16	11
Pyrene	21,000,000	32,000,000	--	11	130	22

**Notes:**

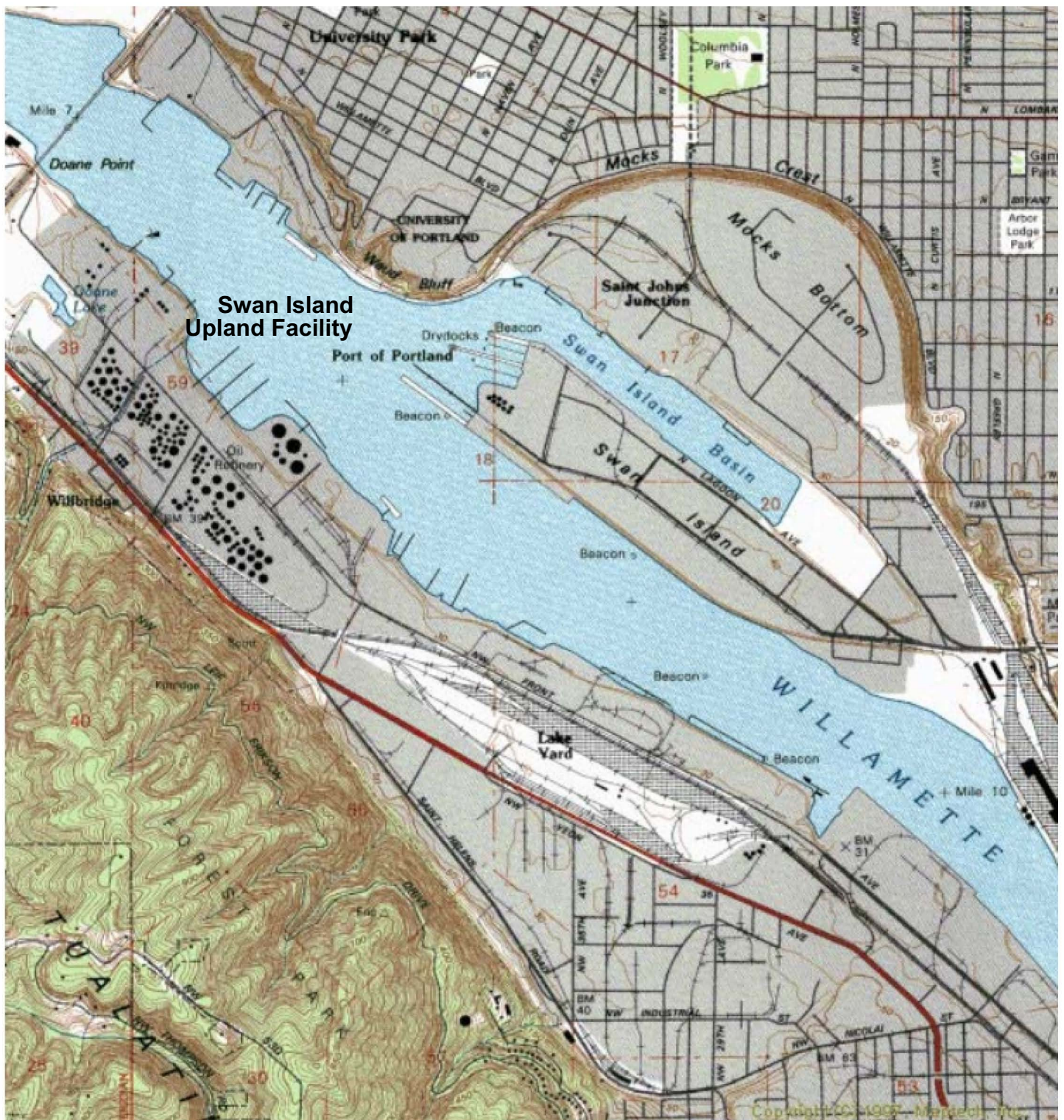
1. PAHs = Polynuclear Aromatic Hydrocarbons by EPA Method 8270C-SIM
2. µg/kg = micrograms per kilogram (parts per billion [ppb]).
3. < = Not detected above the method reporting limit.
4. -- = No screening level available.
5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.  
- For example, Sub K-C-1 = Substation K, Center, Sample 1.
6. RBC = Oregon Department of Environmental Quality Risk-Based Concentrations (RBC Table Revised July 4, 2007) for the direct contact exposure scenario (occupational receptors).
7. SSL = EPA Region 6 Human Health Medium-Specific Screening Levels (December 2006) for soil (industrial outdoor worker).
8. SLV = Oregon Department of Environmental Quality Level II Screening Level Values (SLVs) for Terrestrial Receptors (lowest available value).

Table 4  
Soil Analytical Results: Metals  
Swan Island Upland Facility  
Portland, Oregon

Operable Unit 1 - August 2007 Addendum								
Sample ID: Sampling Interval (inches) Sample Date:	Screening Levels				Sub K-C-1 7 - 19 8/2/2007	Sub L-C-1 12 - 27 8/2/2007	Berth 305-1 11 - 21 8/2/2007	
	Background	RBC	SSL	SLV				
<b>Metals</b>	Concentrations in mg/kg (ppm)							
Antimony	5	--	454	5	0.26	0.08	0.1	
Arsenic	5.8	1.7	284	10	1.7	2	1.7	
Cadmium	0.9	8,600	563	4	0.22	0.07	0.1	
Chromium	26	--	498	0.4	10	15.2	13.9	
Copper	34	38,000	42,178	50	18.8	17.3	14.8	
Lead	17	800	800	16	14	4.77	4.46	
Mercury	0.04	310	341	0.1	0.04	0.05	0.04	
Nickel	21	20,000	22,711	30	15.6	19.3	17.3	
Silver	0.6	5,100	5,678	2	0.03	0.04	0.03	
Zinc	95	--	100,000	50	<b>528</b>	44.8	43.1	

**Notes:**

1. Metals by EPA 6000/7000 Series Methods.
2. mg/kg = milligrams per kilogram (parts per million [ppm]).
3. < = Not detected above the method reporting limit.
4. -- = No screening level available.
5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.  
- For example, Sub K-C-1 = Substation K, Center, Sample 1.
6. RBC = Oregon Department of Environmental Quality Risk-Based Concentrations (RBC Table Revised July 4, 2007) for the direct contact exposure scenario (occupational receptors).
7. SSL = EPA Region 6 Human Health Medium-Specific Screening Levels (December 2006) for soil (industrial outdoor worker).
8. SLV = Oregon Department of Environmental Quality Level II Screening Level Values (SLVs) for Terrestrial Receptors (lowest available value).
9. Background Levels are from the Washington Department of Ecology's publication Natural Background Soil Metals Concentrations in Washington State, dated October 1994. Values are the 90th percentile values for Clark County, except for antimony, selenium, silver and thallium where state-wide data were used due to a limited number of detections.
10. Bold values indicate that the detected concentration exceeds background and the SLV.



Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

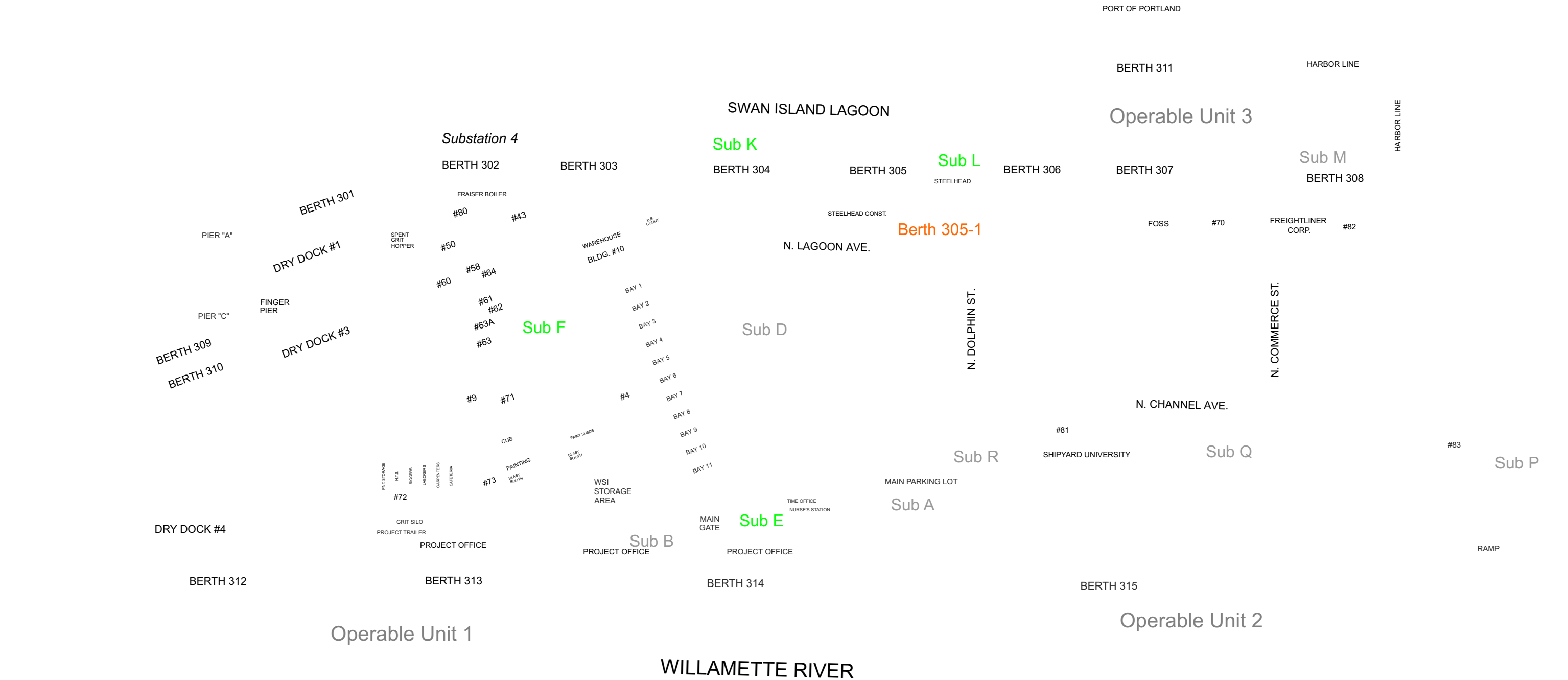
0 2000 4000  
Scale in Feet



## Site Location Map

Former Substation Sampling Results Addendum  
Swan Island Upland Facility  
Portland, Oregon





**Legend:**

Operable Unit 1 Boundary

Operable Unit 2 Boundary

Operable Unit 3 Boundary

Sub K

Kaiser Shipyard Substation Location - 1942 Plan (Locations Approximate)  
- Soil samples collected at North, South, East, and West corners

Berth 305-1

Boring Location

Substation 4

Portland Shipyard Substation Location

N

E

C

W

S

0400800

Scale in Feet

Site Exploration Plan

Former Substation Sampling Results Addendum

Swan Island Upland Facility

Portland, Oregon

Ash Creek Associates, Inc.

Environmental and Geotechnical Consultants

Project Number

1115

November 2007

Figure

2

***Attachment A***

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**Field Exploration Logs**



Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 5-Ft. Sampler**

Drilling Equipment: **Geoprobe 7730DT**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID  
No <5  
SUB E-N-1

## Material Description

Gravel surface over gravel and sand Fill.

SAND; brown, moist, medium-grained, (medium dense).

Becomes silty.

Becomes very silty.

5

Bottom of Boring at 5.0' BGS.

5

10

10

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID  
No <5  
SUB E-S-1

## Material Description

Concrete surface over 4" of void space.

Gravel Fill.

SAND; brown, moist, medium-grained, (medium dense).

Becomes silty.

5

Bottom of Boring at 5.0' BGS.

5

10

10

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**



Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 5-Ft. Sampler**

Drilling Equipment: **Geoprobe 7730DT**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID

## Material Description

SUB E-E-1

No <5

Asphalt-concrete surface over 6 inches of concrete.  
SAND; brown, moist, fine-grained, silty, (medium dense).  
SILT; brown, moist, with trace sand, (medium stiff).  
Wet on surface from 20" to 24".  
Becomes sandy.

SAND; brown-red, medium-grained, (medium dense).

5

Bottom of Boring at 5.0' BGS.

5

10

10

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID

## Material Description

SUB E-W-1

No <5

Concrete surface over gravel Fill.  
SAND; brown, moist, medium-grained, with occasional gravel,  
(medium dense).  
SILT; brown to gray, moist, iron-stained, trace sand,  
(medium stiff).  
Becomes sandy.

5

Bottom of Boring at 5.0' BGS.

5

10

10

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**



Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 5-Ft. Sampler**

Drilling Equipment: **Geoprobe 7730DT**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID  
No <5  
SUB F-N-1

## Material Description

Gravel surface over gravel Fill.

SILT; brown, damp, (medium stiff).

SAND; brown, moist, medium-grained, (medium dense).

5

Bottom of Boring at 5.0' BGS.

5

10

10

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID  
No <5  
SUB F-S-1

## Material Description

Asphalt-concrete surface over asphalt/gravel Fill.

SAND; brown, moist, medium-grained, (medium dense).

Silty from 13" to 16".

Becomes silty.

5

Bottom of Boring at 5.0' BGS.

5

10

10

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**





Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 5-Ft. Sampler**

Drilling Equipment: **Geoprobe 7730DT**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID

## Material Description

Gravel surface over gravel Fill.

No <5

SILT; brown, damp, with trace fine-grained sand, (medium stiff).

SAND; brown, moist, medium-grained, (medium dense).

SUB F-E-1

5

Bottom of Boring at 5.0' BGS.

5

10

10

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID

## Material Description

Concrete surface over gravel Fill.

No <5

SAND; brown, moist, medium-grained, (medium dense).

2-Inch medium stiff silt lens.

1-Inch medium stiff silt lens.

SUB F-W-1

5

Bottom of Boring at 5.0' BGS.

5

10

10

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 3-Ft. Sampler**

Drilling Equipment: **Geoprobe 420M**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID  
No <5  
SUB K-C-1

## Material Description

Asphalt-concrete surface over gravel Fill.

SAND; brown, moist, medium-grained, with trace silt, (medium dense).

Refusal on Concrete at 1.9' BGS.

5

5

10

10



Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 3-Ft. Sampler**

Drilling Equipment: **Geoprobe 420M**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID

## Material Description

Asphalt-concrete surface over asphalt/gravel Fill.

SAND; dark gray, moist, very silty, gravelly, (medium dense).  
No gravel below 16".

No <5

SUB L-C-1

Bottom of Boring at 3.0' BGS.

5

5

10

10



Boring Location: **See Figure 2**

Drilling Contractor: **Cascade Drilling**

Drilling Method: **Direct Push, 3-Ft. Sampler**

Drilling Equipment: **Geoprobe 420M**

Surface Elevation: **Not Measured**

Date Started: **August 2, 2007**

Date Finished: **August 2, 2007**

Logged By: **K. Boris**

Depth to Water (ATD): **--**

Depth, feet  
Sample ID  
Sample  
Recovery Length  
Sheen  
PID

## Material Description

Asphalt-concrete surface over gravel Fill.

No <5

SAND; brown, gray, and reddish-brown, moist, gravelly, silty, (medium dense). Gravel increases with depth.

Berth 305

Bottom of Boring at 3.0' BGS.

5

5

10

10

***Attachment B***

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**Analytical Laboratory Reports (CD-ROM)**